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# USSR Report

ENERGY

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12 SEPTEMBER 1986

## USSR REPORT

### ENERGY

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## COAL

### LOCAL SOVIET, COAL MINISTRY WRANGLE AS CITY FALLS APART

Moscow IZVESTIYA in Russian 16 Jun 86 p 2

[Article by IZVESTIYA correspondent O. Stefashin: "The Red Line on the Map of Karaganda; Here's Where the Interests of Soviet and Department Clashed"]

[Text] The center of Karaganda or, as it is called, the New City, is circled by a heavy red line. The oblast's chief architect, E. Melikov, shows us: "Here is where 'they' stopped. For long--I do not know. They are trying to cross the forbidden line on the northwest outskirts and in the Bolshaya Mikhaylovka micro-district. If 'they' succeed in this, the city will be doomed to destruction."

You listen--it is as if an enemy assault force was landed among the Kazakh steppes. It turns out that "they" are peaceful miners who are selflessly accomplishing the plan for the mining of coal.

Karaganda, as is known, owes its birth to coal. Tens of thousands of people came down here for little more than half a century and the small mining settlement grew swiftly and...chaotically. At one time it received the status of a city, but it did not become a city in its full meaning: the adobe settlements which snuggled against the mines did not know where they began and where they ended. The status of a city required a different development.

They selected an area next to the settlement of Bolshaya Mikhaylovka as the administrative center. But a thick coal seam stretched there. The oblispolkom queried the ministry. From there they replied: the seam is no hindrance because (I quote) "it occurs at a depth of at least 350 meters and there is no danger concerning damage to the capital structures when filling in completely the space which has been depleted." In 1956, the USSR Ministry of the Coal Industry again confirmed that "further buildup of the city of Karaganda (New City) on the territory contemplated by the planning project is considered possible."

In those generally not too distant years new architectural structures appeared which adorn Karaganda even today. They were erected for miners and with the assistance of miners. Interrelationships between the enterprises and the local authorities developed satisfactorily and the city grew and developed, without a hint of misfortune.

At the end of the last decade the "Karaganda Coal" association, having enlisted the support of the ministry, turned to the oblispolkom with a request that it permit, as the miners express it, partial "underworking" of the city's central

districts. The plan, they explained, is becoming more and more difficult, the "rich" seams have dried up, but there are very rich deposits under the center of the city: twice as much coal as was mined by the basin during all the years of its exploitation. With underworking there are inevitable consequences: the mining of each million tons of raw material entails the destruction of seven hectares of the Earth's surface. Therefore, the ispolkom imposed a condition: the workings must be completely filled with waste rock. The coal miners agreed, but...in the Kirovskiy Rayon dozens of hectares acquired the appearance of the lunar surface. Almost none of the former structures survived. Craters 18 meters deep are preserved alongside the wonder.

The example of the old city warned against new errors. But mining engineers now assured us that they would conduct mining operations only on the outskirts where private small houses which are living the rest of their days stand. Their demolition, they repeated over and over again, will prove to be a blessing for Karaganda: the association will offer modern apartments, lakes will spread on the recultivated lands, and parks and squares will turn green. The promises were not reinforced by calculations. Despite this, the oblispolkom again gave its agreement, stipulating again that the mining must be conducted with the filling of the workings with waste rock and to strictly stipulated limits. As the experience of the same Karaganda shows, it is simpler than simple to give the most "reliable assurances". The mining engineers were not sparing of words and... they continued to take coal without filling in the depleted space with waste rock. The shifting of the rock began.

Here the oblispolkom should have admitted its error and rescinded the rash decision. Alas, it displayed its first concern only after four years. On its insistence a special commission of the ministry arrived in Karaganda. But, as is their custom, the USSR Ministry of the Coal Industry did not discover violations in the operations of its own enterprises and it defined the problem which had arisen as "typical of all coal-mining regions." Moreover, then a document was born which directs the mining engineers to "ensure the re-activization of reserves of coal beneath built-up territories."

The order, which was issued by the former minister, B. Bratchenko, announced the start of a new assault. Complete or partial destruction threatened 430 hectares of city territory, residential buildings with a total area of 600,000 square meters, 58 objects having a socio-cultural and domestic services purpose, and 17 industrial enterprises. The buildings of the city and oblast Soviets turned out to be within the danger zone! It was then that the "red line" appeared.

Even last year the oblispolkom could have stopped the operation of several shafts which inflicted the greatest damage on the city. An extreme measure, but justified. We close down plants because they poison the atmosphere and throw waste products in a tiny stream.... But here "Karaganda Coal is transforming the oblast center into ruins and the ispolkom does not hasten to call it to order. Why?

The explanation, in general, is simple. The slightest stopping of work will be substantially reflected in the economic indices of the oblast, in the total volume of whose production the share of the coal miners is almost 30 percent. Obstructing a plan is not the same as demolishing a house, for you see, they

are held strictly accountable , including agencies of authority. And this alone ties the hands.

I speak with the chairman of the gorispolkom, R. Ilyasov. I ask him: did the chairman see a map of the underworking at least once? It turns out that the gorispolkom does not have a map of the mining of coal beneath the city of which it is the master! Just how can it monitor how correctly the mining taps are being used and whether the destroyed land sections are being brought to a safe condition? The ispolkoms learn where the coal miners are now mining from the suddenly collapsing structures and cave-ins on the roads. Recently, a crack ripped open the building of secondary school No 100. This means that "they" have already passed the middle of Mikhaylovka....

Here is what I heard most often from the leaders of the city and oblast ispolkoms: "It is difficult to work with the miners, they are an enterprise of higher subordination. How can you hold them responsible if even trifles must be settled through the ministry?"

Actually, the Soviets virtually have no legal grounds for seemingly equal mutual relations with "Karaganda Coal." Almost the only path to coordinated actions lies through personal contacts. And this, as a rule, consists of requests and persuasion. The giant is "uncontrollable" for local authority. And nevertheless.... Did the Soviets utilize completely their capabilities in such a serious matter as the fate of the city of Karaganda?

Yes, the Soviet will not curtail the plan for the association. But it is within its competence to halt dangerous production and also to require observance of the law. I do not say that the oblispolkom looks at arbitrariness indifferently. It is suffering with as much pain as any of the Karagandites for what has occurred. But it does not become the Soviet to express its indignation with "oh's" and "ah's" alone. Decisive actions are awaited from them. But they have not taken sufficient ones.

At one time the oblispolkom saw to it that miners began to fill up the depleted space with waste rock. Although meagerly, the ministry allocated equipment and resources for these purposes. And what happened? The mine imeni the 50th Anniversary of the October Revolution, whose mining share beneath the city's territory was most considerable, is accomplishing protective measures on only one ninth of the area. The others are doing even less. For a time the oblast and city ispolkoms hurried the miners, and then they stopped. The general director of the association, N. Drizhd, dispenses assurances for the future, and the Soviets listen to him trustingly, setting hopes on quick changes. But judging from everything, there is no whiff of changes.

One day I attended a conference of the surveying section of the scientific and technical council, USSR Ministry of the Coal Industry, and here is what I heard from the mouth of the head of a department of the Central Scientific and Research Institute for Geomechanics and Surveying, M. Petukhov. To the question of what will become of Karaganda by the year 2000, he answered without philosophizing, "Either it will be torn down or they will build a new city."

Of course, the plan should be thought of and money should be considered. We also provided the following figures in the association. On the territories being underworked, hundreds of individual houses are being subjected to destruction and are being demolished. Their owners are being offered apartments and, simultaneously, monetary compensation. It comprises about five million rubles for the five-year plan. In addition, the corresponding resources are allocated to "Karaganda Coal" for the restoration and repair of buildings and destroyed communications. Last year, for example, the miners received 13.5 million rubles. They have been far from completely used, but this is the subject of another conversation. Tremendous sums are being allotted for housing construction: the association has now received 18.6 million rubles, primarily for migrants. And meanwhile, in Karaganda there is a catastrophic shortage of housing and the need for schools, kindergartens, and objects of culture and domestic services is great--they talk about this at almost every session of the Soviet. The miners often pledged to pay compensation for the damage caused the city. Compensation in kind was what was in mind: a home was smashed--provide a new one in its place, it was damaged--repair it yourself. This is not being observed in fact.

And this concerns not only homes. The fact is that underworking led to the instability of public services for the entire city. When land settles electric and telephone cables, water lines, and sewer systems break. Any underground mining is also accompanied by a rise in ground water. It floods basements and inundates entire settlements. And later rotten swampy spots arise in that place.

The working day of the deputy chairman of the gorispolkom, P. Soloshchenko, begins with the question: "How much damage occurred during the night?" One day I looked over the report which he had received. At that time 49 big instances of damage had not been eliminated and the residents of 244 tenement houses were left without water.

"On individual days," Soloshchenko sighed, "up to 150 instances of damage are accumulated. The most significant cannot even be extinguished in a week. It is difficult even to estimate how many assets floated away from the city budget and are still floating away through broken pipes."

And what about the plenipotentiary "tenant" of Karaganda--the Ministry of the Coal Industry? It and its association are calm--there should have been a plan, and what the city expects, they say, is the city's matter. In the current five-year plan the plans of "Karaganda Coal" for underworking, despite the objection of the oblispolkom, remained at the level of past years. Homes with an area of 400,000 meters and dozens of buildings for administrative and other purposes are suffering. The miners sent out warning of the impending destruction to 46 enterprises....

Clearly, the local organs again are passing resolutions and calling for order. And the miners are bombarding the oblispolkom with demands that the restrictions be lifted and the bans be cancelled. Letters and telegrams reach the republic's Council of Ministers, Gosplan USSR, and the country's Minister of the Coal Industry. It is declared in them as an ultimatum: if the oblast Soviet does not review its decision, the association does not guarantee accomplishment of the plan.



The estimate is accurate. The oblispolkom is being pressured from all sides. Almost every month the oblast's architect must provide explanations to higher authorities.

"There is no strength to resist, it seems that a little more and I will surrender," he says in a fit of temper.

However much we say and write: power is the lever which permits the Soviet to defend the interests of its electors decisively and uncompromisingly and to steadily implement the planned social and economic program. But when the Soviet comes up against the actual pressure of mighty departments, its rights remain but, unfortunately, for the present are not being realized.

The ispolkoms most likely have only one possibility to save the city from destruction--to halt the mining of coal beneath the residential areas. They say, it is not suitable to speak freely. But let us look at things realistically. The association will not be able to reorganize itself rapidly even with the active assistance of the ministry. Time is needed to bring the filling work to order, to make the necessary geological estimates, and so forth and so forth. But, you see, a city is threatened, and not a tiny city!

Thus, it may be that the Soviet will wait a long time to screw up its courage and, relying on the force of law, will decisively halt departmental willfulness. And let the cost of this be charged to the guilty one....

The red line on the plan of Karaganda was stretched like a bow string.

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## NUCLEAR POWER

### AZERBAIJAN NUCLEAR POWER PLANT CONSTRUCTION PROGRESS

Baku BAKU VYSHKA in Russian 7 Jan 86 p 1

[Article by A. Gamedov: "It Is Possible To Work Faster"]

[Text] Nuclear power plant construction has become an indicator of the rapid pace of implementing technological progress. And that is not all. Those who become involved in boosting the nation's electric power base find that they themselves become active participants in this progress...

This was the line of reasoning taken by managers of the "Azenergostroy" trust in prefacing their remarks. "Azenergostroy" is general contractor for construction of the Azerbaydzhan Nuclear Power Plant. This is a reference to understanding the importance of the construction task now facing builders and the effort to come to grips with it as well as possible. In wrapping up his remarks, acting manager of the trust and delegate to the 31st Congress of the Communist Party of Azerbaijan, R. Gamidov, had this to say:

"This past year has seen continued expansion of the industrial base for constructing nuclear power plants. As originally projected, the volume of construction work was valued at 5.6 million rubles. The plan was over-fulfilled by 30,000 rubles. In talking about completed projects, I would like to mention first of all the three kilometer long railroad spur which linked our pioneer site with the railroad. Since it went into service we have experienced a tremendous relief inasmuch as we have begun receiving railroad cars directly at the construction site. This speeds delivery of building materials and subassemblies, while also cutting highway transportation costs.

"Furthermore, a GDR-manufactured asphalt plant has been put into operation which has an hourly production capacity of one hundred metric tons. Now, the brigades' capacity for asphaltting highways and assembly areas has been expanded. Many operations can now be carried out at an accelerated pace and with high quality. We have also added a concrete plant and shops for fabricating steel concrete reinforcement and concrete forms.

"For the benefit of those employed there, necessary amenities have been put in place. The workers are housed in good-quality two-story houses,

socalled container type houses. An auxiliary boiler building has been erected. The houses have electricity and water.

Each year, the scope of operations is due to be expanded. The plan Basic Directions for Economic and Social Development states: "Proceed with construction of the Azerbaydzhan Nuclear Electric Power Station. According to the plan, ten million rubles of capital investment have been approved for the first year of the 12th Five-Year Plan. But managers of the "Azenergostroy" trust estimate that this is too little. Based on their calculations, it would be feasible to handle a volume of work valued at fifteen million rubles, twelve of which would be used for industrial construction, while three would be used for constructing living quarters. The funds are needed for completion of the pioneer base, for erecting the construction base as well as a base for the department of worker supply: warehouses, buildings for dining halls, living quarters for workers building the metal fabrication plant, and for the house construction combine, a housing are for future nuclear power plant operators.

Time is passing, deadlines are closing in, the work should not be allowed to fall behind, the pace for erecting the giant four million kilowatt power station...all this is what is worrying the general contractor today. A more tension-packed task would be more than he could handle. The collective of the trust "Azenergostroy" has proposed a counter plan for 1986 which exceeds the original one by five million rubles. It is hoped that its initiative will find support at the USSR Minenergo.

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## NUCLEAR POWER

### STATUS OF VOLGODONSK ROSTOVSKAYA AES CONSTRUCTION

#### Brigade's Work Detailed

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 7 Jan 86 p 1

[Article by SOTSIALISTICHESKAYA INDUSTRIYA correspondent L. Shamardina from Volgodonsk: "Mentioned by Name"]

[Text] The go-ahead to begin construction had finally been given. Up to this point, the cranes had been idle for four days straight due to interference from high winds. The construction workers were running out of patience. They were literally waiting for fair weather.

With obvious excitement, brigadier Sergei Iskortsev gave the signal to the crane operators, "Take her away!" The lines were tautened and the metal lug curved by the bracket of the massive load slowly but surely floated upward.

This section of the reactor's shielding weighing several metric tons was covered with a bright pink protective layer resembling the petal of some unreal flower. Slabs like this are installed tier upon tier in the construction of the shielding of the containment, "the home of the reactor."

To assemble the first "petal," the brigadier called in the most experienced personnel. A nuclear power plant is a special type of structure, the ultimate challenge for a construction worker. A person's work record is rated carefully here, not on the basis of years and months, but rather by the meter. Speaking of his own experience, Iskortsev had this to say, "You might say I got in on this job from the ground floor."

This means from the footing, from the foundation. The same could be said of each of these construction workers from the outset. Each one has completed the construction school, Atommasa, and each has a class four or five rating.

Up on level 13, foremen A. Chernavin and N. Deshevykh already have the slab. Now the main thing is to see that it settles onto its support ring "on all fours."

"Got it!"

Welders A. Meka and N. Deyev coolly lower their helmets and in no time, a strong, fiery weld begins to join the base structure.

Construction had been started at dawn and continued into the second shift. But no one from the first shift would leave the site. So all had a hand in finishing it together.

"This is a big event," explained brigadier S. Iskortsev on behalf of everyone. "Just think--We started the containment and went on to the operating area. And our construction project will be mentioned by name in the Basic Directions."

S. Iskortsev's brigade won the privilege of constructing the shielding of the containment over fierce socialistic competition. For Komsomol-youth this is also a kind of resume entry. Now the construction worker brigade from the Kalinin nuclear power plant has entered the race. These reinforcements from the Kalinin plant almost doubled the number of workers on the job, permitting work on the reactor unit to proceed, as it were, in three rings. The outer structure is being handled by the brigade of M. Dyankov, the shielding, by the men from Kalinin, while Sergei Iskortsev and his comrades have been given the job of constructing the internal hermetic structure.

The brigades are in competition with one another. At this point, all the "petals" of the first tier are already being joined. Taking stock each day, senior foreman A. Ardyukov reminds the workers: "We have to be gone from the first unit by September of 1986. We will complete the entire shielding, giving the power people the allotted time before going on line. We must do everything in our power to meet this objective!"

#### Poor Planning Delays Construction

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 31 Jan 86 p 1

[Article by SOTSIALISTICHESKAYA INDUSTRIYA correspondent L. Shamardina from Volgodonsk: "Time Is Passing By"]

[Text] The first year of the five-year plan, the year just before the Rostov nuclear power plant is scheduled to go on line--did it get off to a good start? Before confronting management with this question, I decided to stop in as usual at the reactor job site to see how things were coming along on the big job.

During December there had been noticeable progress on the first unit of the station. But lo and behold, since the beginning of January, virtually nothing more was done.

"What kind of progress do you expect...", "observed N. Boyko, head of the Volgodonsk administration "Gidromontazh," with a note of irritation.

Nodding in the direction of a giant hundred-ton crane, he continued, "...if the main worker hasn't budged for a whole hour..." The holdup is chemical protection...

None of the metal structures of the reactor unit may be erected without a protective coating. All told, the workers of the section "Yuzhenergokhimzashchita" have barely been able to put in two days' work over a two week period.

"Under the circumstances, there is really nothing more we can do," said "Khimzashchita" foreman V. Shilin pointing to a strange-looking apparatus made of film under which men are working with paint sprayers at incredibly close and cramped quarters.

In order to set up correct conditions for working with chemical coatings--above--freezing temperatures, quick drying--a heated shop was finished on schedule last month, a spacious shed with folding doors. Components are wheeled in on a flatcar through one set of doors and back out another, once they have been treated. However, in the rush to complete the extension, the railroad spur for the flatcar was not properly lined up with the doors. This means that the components cannot get through. As things stand now, either a wall will have to be demolished or the railroad spur will have to be relocated.

What workers from the fourth section built under the direction of K. Isaeva has proven to be an ill-fated, and so far, useless enclosure. It is they who stand to lose the most from the delays in painting and erection of the structure.

Accelerating crane startup and straightening the railroad spur hardly qualify as ministry-level problems. How does it happen then, that these and other, similar problems have been the very ones that have hindered progress at the construction site since the first of the year? No doubt one, two and certainly three months would have been ample time for a lot of things to be seen and corrected.

But all during this time, which could soon be a year, the controlling echelon of the Rostov nuclear power plant has been occupied, not so much with work but with the prospect of reorganization. According to data from an analysis conducted by specialists, six months ago, the construction project completely dropped off the chart for four months. Finally, in mid-September, the decision was officially made to reassign "Atomenergostroy" from under the "Volgodonenergostroy" trust, making it a separate subdivision.

Incidentally, the issue regarding the change in leadership at the Rostov nuclear plant site was also resolved. This decision was made, as it were, just in the nick of time: there was still time to reshuffle in preparation for beginning the first year of the 12th Five-Year Plan without red tape and at the right pace.

However, the USSR Minenergo, "Soyuzatomenergostroy" as well as personnel at the Volgodonsk site, have paid only lip service to this decision which

was so long in the making..Right up to the tenth of January (!), 14 out of 26 atomic energy construction brigades were still assigned to other projects totally unrelated to nuclear power plants. And when they did return to the job, it was without the necessary groundwork, materials or equipment.

In order to ensure that the first power-generating unit of the station goes on line as scheduled in 1987, this year will have to see completion of construction and erection operations to the tune of almost 17 million rubles--two and one half times the amount needed in 1985. Furthermore, to this end, there will still have to be a transfer of management, materials and equipment from one organization to the other. In a word, the changes called for on paper are just getting underway...

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## NUCLEAR POWER

### RENOVATION OF IZHORA NUCLEAR PARTS PLANT REVIEWED

Moscow NA STROYKAKH ROSSII in Russian No 5, May 86 pp 11-13

[Article by I. Strikalov, chief engineer of the Izhorstroy [Izhora Construction] Trust No.35: "Atommash: the Experiences of a Model Construction Project"]

[Text] In July 1981, Gosstroy USSR decided to include the plants of the "Izhora Plant" of Nuclear Energy Machine-Building Production Association within its 11 model construction projects. The purpose of the model construction site was to extensively introduce into practice the most effective forms and methods of construction organization, the achievements of science and technology and the leading domestic and foreign experience.

The facilities of the PO [production association] "Izhora Plant" are being constructed, reconstructed and expanded by the organizations of Glavzapstroy [Regional Main Bureau for Construction in Western Regions of the RSFSR] and Minmontazhspeystroy [Ministry of Construction and Special Construction Work]. The general contractor is Trust 35 of Izhorstroy, one of the oldest in the country. It was created during the 3rd 5-Year Period when it became urgently necessary to reconstruct plants. In 1966, it was awarded the Red Labor Medal for its successes in fulfilling the state plan and for its high technical and economic indicators.

Starting in the 9th 5-Year Period, the collective's efforts were 90-percent concentrated on reconstruction and expansion of the Izhora plant. During the first four years of the 9th 5-Year Period, the trust spent 172 million rubles and began work on 14 construction sites. At the present time, it includes 6 general-contractor construction bureaus and carries out 50 million rubles worth of work each year.

The trust devotes a great amount of attention to technological design documentation and issuing blueprints. This makes it possible to find more efficient planning and design ideas. In order to lower labor costs on construction, not only are typical prefabricated ferroconcrete structures used but also nonstandard structures made within the trust from its own resources.

Therefore, when natural gas lines are laid, L-shaped structures from fire-resistant concrete are used while the access, technological and electrical-



cable tunnels are assembled from ferroconcrete blocks. The savings achieved through the introduction of these structures amounts to 1000 m<sup>3</sup> 6000 rubles and a reduction in labor of 437 man-days.

For 13 years, large industrial buildings have been erected using the conveyer-block method of assembling covers [pokrytiya] using elements of up to 200 tons in weight and 24 x 42 meters in size. An efficient arrangement of conveyer lines for the assembly of cover units was developed by one of the brigades of the Orgtekhstroy [possibly State Institute for the Introduction of Advanced Industrial Engineering Methods in Construction] Trust with the participation of other interested organizations. By the present time, more than 300,000 m<sup>2</sup> of such floors have already been assembled. The savings achieved is 117,000 rubles and construction timer has been considerably reduced.

The conveyer method is also used to assemble travelling cranes with mechanical and electrical work at its zero mark. This made it possible in the construction of the metal-rolling shop to considerably reduce the time it took to start operating the cranes and then use them under crowded conditions to assemble amalgamated equipment.

In the construction of industrial complexes, it is common practice to assemble furnaces from amalgamated units that have been preliminarily lined with fire-resistant materials. Structural elements of higher readiness (such as crane tracks and brakes, etc.) and technological equipment are also used.

During the 12th 5-Year Period, the volume of construction and assembly of the sheet-metal rolling complex and a series of other facilities at Izhora Plant will grow sharply. The basic new directions and reserve potential which will make it possible to increase labor productivity by 17.9 percent instead of the planned 15.6 percent and to provide a further growth in construction in 1985-1990, have been formulated in the Intensification-90 program. Construction work is also being done in new territories with complicated hydrogeological conditions. In the technological peculiarities of the construction work, the sites are distinguished by a strongly-developed zero cycle with the foundation marks between -1.00 to -25.00.

Trust 35 and Orgtekhstroy have gained a lot of experience in the organizational and technical ideas of zero cycles with developed underground work under complex hydrogeological conditions, a high level of ground water and weak soils at the construction site. As a rule, when the PPR [work plan] for zero-cycle work is being developed, the methods and sequence for construction of the surface portions of the job are considered. Work is very widely organized from the intermediate levels of the foundation pits as in the following manner: a foundation filling mark is chosen at which the structural framework and some of the equipment will be set in accordance with whether the soil that is supposed to be filled in around the foundations will later be used fill the ground back up to its proper level.

This intermediate level is where the equipment will be set up, temporary roads built and structures set in place in both the second stage of the zero cycle and the ground cycle. Practice has shown that organization of work from intermediate levels of the pit sharply reduces ground-moving work, especially

when most of the excavation has been done, reduces to a minimum the moving or shifting of roads, assembly sites, crane and earth-moving equipment thoroughfares, communications, etc. and also reduces costs.

For the first time in Leningradskaya Oblast industrial construction under such complicated hydrogeological conditions to, Trust 35 and the Fundamentproekt [Foundation Design] Institute experimented with 1000-mm piles and introduced them to the construction of the shaft and gear shop and the generator repair shop. This was done using an SO-1200 pile driver.

The most important element of the model construction project is the strict management system. A construction staff with a dispatch section was continuously active during the construction of the industrial facilities of the Izhora Plant. This group's principal tasks were to monitor everyday the course of work according to schedule and prepare information and specific suggestions on how to eliminate deviations in the construction process. A computer is used to prepare yearly, quarterly and monthly SMR [construction installation work] plans and to break them down according to the "A-Plan" methodology and to monitor work using an automated data-processing system. The trust's introduction in 1980 of a system of calendar planning according to the "A-Plan" methodology has considerably reduced the amount of work in preparing starting data and increased the library of working documents.

Under present-day conditions in which the scale of construction and number of participants have been sharply reduced, the per-unit productivity of individual machines and lines has increased and the level of specialization has risen, it has now become more important to use progressive methods of construction organization and coordinate the efforts of all participants. One of the most effective methods is the nodal method of designing, preparing, organizing and administering construction work. This method is made all the more necessary by the complexity and large scale of SMR (more than 120 million rubles) and the extremely reduced building times. The decision was made to introduce this method once 65-70 percent of the design and budget documentation was already prepared and the construction of the foundations for the building was already fully underway.

The design organizations of Leningiproenergomash [Leningrad State Institute of Power-Generating Machinery Design], Leningprometz [Leningrad State Institute of Metallurgical Works Design] and Lenpromstroyproekt [Leningrad State Institute of Industrial Construction Design] were given the task of reworking the design by breaking the complex into units. The work was done under the slogan that "Every unit is a site". Consequently, for every unit, there were prepared estimates, a list of blueprints, required specifications, schedules and certificates. The designers worked in close cooperation with Trust Number 35 and Orgtekhstroy. This cooperation produced the documentation for the different units in May 1983. The construction site was broken down into 36 units of SMR costs of one to five million rubles. The units were grouped into subcomplexes according to territorial and technological characteristics. Therefore, the unit method for construction of the LPTs-5000 [not further identified] was organizationally included in the system of operative control and is one of the components of this system.

A good industrial base constitutes a reliable foundation for industrialization of construction. It makes it possible to quickly introduce the achievements of technical progress, high-speed technological processes (such as the assembly of various structures into amalgamated units) and increase the level of mechanization. Without it, it is impossible to intensify construction. Trust 35 now has the best base in Glavzapstroy. Its workers are presently busy overhauling equipment. Its machine park is nearly 100 percent ready and its personnel turnover is very low. It has a highly-mechanized storehouse of spare parts. There was also built a new base at a complex of subsidiary plants of the trust. Here, they are manufacturing metal structures and "sandwich" type light-weight panelling. Facilities for making reinforcement meshes have been put into operation. Since 1985, the trust has switched to centrally supplying its construction sites with reinforcement mesh, frames and parts manufactured by itself.

The production base was even further expanded by the introduction in 1985-1987 of the following:

- a concrete mixer with a capacity of 100,000 m<sup>3</sup> for the manufacture of construction concrete of grade 200 and 300, fire-resistant concrete, hydrostatic concrete of higher density with separate preparation of NIL-20 plasticizing agent from sulfite-yeast mash;

- a reinforcement-producing shop that can produce 15,000 tons of commercial-grade reinforcement per year;

- division for the manufacture and repair of concrete forms with a capacity of 25,000 m<sup>2</sup> per year;

- ferro-concrete shop with a capacity of 12,000 m<sup>3</sup> per year;

All of this has made it possible to provide a substantial growth in worker productivity during the 12th 5-Year Period.

The orderly introduction of brigade organization has done much to help achieve technical and economic indicators. Over four years of the last 5-year period, the use of this method cost 40 million rubles which is 50 percent of the volume of work carried out by the trust itself at industrial construction sites alone. In 1990, according to the measures called for in the Intensification-90 program, more than 65 percent of the work will be carried out according to principles of cost efficiency.

At its model construction sites, Glavzapstroy regularly conducts various seminars and conferences for technical and economic councils and organizes advanced technique schools. Elements of advanced techniques are already being

introduced at another model construction site -- the Kingisepp "Fosforit" Complex. The chief committee has decided to organize a model construction site in every trust and construction DSK [housing construction plant].

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## NUCLEAR POWER

### BRIEFS

CHERNOBYL BLOCK 5 CONSTRUCTION--Moscow--Competing to provide a fitting welcome for the 27th Congress of the CPSU, the collective of the production association "Atommash" pledged to complete the No 5 unit now under construction at the Chernobyl nuclear power plant and to complete fabrication of a steam generator for the Rostov nuclear power plant one month ahead of schedule. [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 1 Feb 85 p 2] 12978/9190

VORONEZH AST WORKERS' SETTLEMENT--Voronezh--A new place name has appeared on the map of the Voronezh Oblast. The status of workers' settlement has been granted to a new residential micro-rayon which is being erected for construction workers and operators of the Voronezh Atomic Heat Supply Plant. Contemporary 9-story buildings have already sprung up, complete with advanced-concept apartments, stores, cafe, kindergarten, and school. The power workers' settlement is being named Shilovo in commemoration of the Shilovo bridgehead, scene of fierce fighting with the fascist aggressors during the Great Patriotic War. [By S. Sheremetov] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 12 Feb 86 p 2] 12978/9190

KURSK AES BLOCK 4 COMPLETED--Kurchatov--Four months ahead of schedule, the fourth 1,000 Megawatt unit of the Kursk AES was brought up to design power capacity. Early completion was possible mainly due to the high-quality workmanship on the part of construction and installation workers who rated an "A" for their efforts in turning out this extremely complex power installation. It was the operators who then took it from there to put the finishing touches on an efficient, well-coordinated job, debugging all systems of the new unit in minimum time under industrial loading conditions. [By IZVESTIYA correspondent V. Kulagin] [Text] [Moscow IZVESTIYA in Russian 9 Feb 86 p 1] 12978/9190

KHMELNITSKIY AES DEFICIENCIES ELIMINATED--Moscow--A critical article by O. Lapko, party committee secretary of the management of the Khmel'nitskiy AES construction project, appeared under the same title in No 128 of STROITELNAYA GAZETA in 1985. Soyuzatomenergostroy reported that within the association there was joint discussion with top construction project management of matters concerning the supply of brigades working by the brigade contract method with materials, subassemblies, and equipment. Procedures were established for eliminating the deficiencies mentioned in the article. The

construction project management is formulating steps which will be established to ensure that power unit No 1 goes on line during 1986. Defects allowed by the Kurakhovsk boiler-mechanical factory in the fabrication of engineering components have been eliminated. The guilty parties were punished by order of the association, effective November 18, 1985. [Text] [Moscow STROITELNAYA GAZETA in Russian 15 Jan 86 p 2] 12978/9190

NEW RAILROAD TO BASHKIR AES--Moscow--Freight deliveries to the Bashkir AES now under construction have been stepped up. This was made possible by a railroad spur which links Neftekamsk with the future Atomgrad. [Text] [Moscow EKONOMICHESKAYA GAZETA in Russian No 47, Nov 85 p 3] 12978/9190

RIGA NUCLEAR-POWERED LIGHTHOUSE OPERATIONAL--Riga--At the approaches to the Gulf of Riga, Latvia's first nuclear-powered lighthouse has gone into full-time operation. Instead of traditional sources of power, these lights rely on radioactive isotopes of strontium. The thermal energy given off in this miniature nuclear "reactor" is converted into electrical energy. The lighthouse's place of service is the Irbenskiy Strait, located on the Baltic. The abundance of shoals in this strait makes navigation difficult. In autumn and winter, this area is often buffeted by storms. Hence, the new lighthouse is called "Irbenskiy." It is thirty-seven meters in height and is constructed on a solid foundation of steel-reinforced concrete. Located within it is a shaft for marine communication which permits the use of energy from the waves for pneumatic "sirens," an acoustical signal which can be heard at a distance of one half mile. The beacon from the lighthouse produced by the peaceful atom is visible to navigators sixteen miles away. An automatic system also controls all the equipment in the Irbenskiy Lighthouse. At nightfall, it switches on the light/optical apparatus whose beams direct every seaman to safety. [By IZVESTIYA correspondent Ye. Vostrukhov] [Text] [Moscow IZVESTIYA in Russian 9 Feb 86 p 3] 12978/9190

GIANT URBINE FOR NUCLEAR TETs--Kharkov--The association "Kharkov Turbine Factory imeni S. M. Kirov, which had previously managed to turn out production models of the "millioniki" [turbines with 1 million kw capacity] aggregates for the nuclear power industry despite tight schedules, has now begun development of the world's first working extraction turbine rated at 1.07 million kilowatts. In addition to electrical power, it will provide up to 1,200 Gigacalories of heat per hour which will be used to heat living quarters. The first installation of its kind, this system is destined for the Minsk ATETs. [By SOTSIALISTICHESKAYA INDUSTRIYA correspondent A. Vyatkin] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 22 Jan 86 p 2] 12978/9190

AES VALVE PRODUCTION INCREASE--Novgorod--At the Novgorod valve factory, construction has begun on new production capacities. They have made possible a considerable increase in the production of pipeline valves intended for nuclear power plants currently under construction in this country as well as in other socialist countries. This year, the collective of the enterprise will deliver to nuclear power plants located in CEMA

member countries production of this type valued at one million rubles more than in the previous year. The growth in productivity is made possible by the implementation at the factory of scientific-technical advances including powder metallurgy and robotics. [By V. Troyanovskiy] [Text] [Moscow IZVESTIYA in Russian 28 Jan 86 p 1] 12978/9190

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## NON-NUCLEAR POWER

### RSFSR MINISTRY REVISES HEAT SUPPLY PLAN FOR SMALL CITIES

Moscow NA STROYKAKH ROSSII in Russian No 3, Mar 86 p 60

[Text] On the development of heating-supply systems for cities of less than 100,000 inhabitants and increasing their efficiency in order to save fuel and energy resources.

The State Republic Planning Institute of the Municipal Power System Management [Giprokommunenergo] of the RSFSR Ministry of Housing and Municipal Services [Minzhilkomkhoz] along with other design organizations is working to develop heating-supply systems in accordance with the budget allotments of Gosplan RSFSR. In 1984-85, heating-supply systems were developed for 77 cities in the RSFSR and it is expected that all 77 systems will be started up on schedule by 1988.

Giprokommunenergo, as the chief organization responsible for this work, has prepared and sent to all interested organizations its standards on the development of heating systems, typical tasks and a list of initial data.

The development and approval of heating supply systems involves some substantial difficulties. Most ministries and departments have taken a localized approach to examining and approving efficient ideas on the use of heat sources and this has led to unreasonable dispersion of fuel and power sources and an increase in capital investments. The time spent on reviewing produced systems has increased and the suggested technical ideas were rejected by the Ministry of Agricultural Machinery, the RSFSR Ministry of Meat and Dairy Industries, RSFSR Ministry of Food Industries, the Sakhalin Oblast Executive Committee and several other ministries and departments. Many of the design organizations brought into the development of heating-supply systems have not been active enough in this work.

The committee asked the USSR Ministry of Power and Electrification to recommend that VNIPIenergoprom [All-Union Scientific Research and Design Institute of the Power Industry], which was given the task of providing methodological direction over the designing of heating systems for cities and other inhabited areas, accelerate its preparation of the new "Statute on the Development, Coordination and Approval of Heating Systems" and stipulate in it a period of 45 days for all involved organizations to work out their agreements on how the systems are to be built.



The RSFSR Minzhilkomkhoz will have greater control over the building of heating supply systems for cities of less than 100,000 inhabitants and will prepare and issue in the required order further suggestions on developing heating supply systems for cities and other settled areas of less than 20,000 inhabitants.

The committee has charged the directors of a series of institutes under Grazhdanproekt [probably Civil Design Institute] to make designers more responsible for their work on heating systems and to quickly work out working agreements with Giprokkommunenergo.

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## NON-NUCLEAR POWER

### RSFSR MINISTRY REVIEWS 5-YEAR MUNICIPAL THERMAL POWER PLAN

Moscow ZHILISHCHNOYE I KOMMUNALNOYE KHOZYAYSTVO in Russian No 5, May 86 p 11

[Unsigned article under the rubric "At the RSFSR MZhKKh [Ministry of Housing and Municipal Services]: "Thermal Power: Frontiers of the 5-year Plan"]

[Text] The collegium of the RSFSR Ministry of Housing and Municipal Services has been reviewing measures for further development and improvement of the reliability of thermal power management in local soviets in cities and worker settlements of the Russian Federation for 1986-1990.

The collegium stated that during the 11th 5-Year period, the ministries of housing and municipal service of the autonomous republics and the housing and municipal service bureaus of the kray and oblast executive committees have carried definite measures for expanding, increasing the efficiency and strengthening the material and technical base of thermal power plants.

Since the start of the 5-year period, large 7100-Gcal/hour thermal power plants have gone on line. This and other measures have made it possible to increase our resources for centralized public-housing heating by 80 percent, shut down 1610 small and inefficient boilers and increase the unit output of communal heating boilers by as much as 5.3 Gcal/hour (by 8,2 percent over 1980). The overall percentage of inefficient small heating units (of up to 3 Gcal/hour) was reduced from 80 to 76.6 percent and they now produce less than 17 percent of all generated heat.

Heat is generated in 873 cities and other inhabited areas by 476 specialized plants which together comprise a total of 8093 heating boilers and cover 19,400 kilometers of steam lines. In 1984-85, more than 1200 boilers were received from local soviets, ministries and departments.

In addition to this, there are certain shortcomings in the development and operation of thermal power systems and these have made it increasingly difficult to provide enough heat to cities and other inhabited areas. In the winter of 1984-1985, there were disruptions in the heating supply to public housing and buildings in the Altaysky and Khabarovsky Krays and in the oblasts of Kemerovo, Magadan, Novgorod, Pskov, Novosibirsk, Chelyabinsk and others.

In 34 large cities (Vladivostok, Biysk in Altaysky Kray, Ivanovo, Kurgan, Kirov, Novosibirsk, Ulyanovsk and others), there was a pronounced shortage of thermal power.

Small boilers are being shut down too slowly in the Karelian, Tatar and Tuvin ASSR's, the Primorsky Kray and in Kaluga, Lipetsk, Tomsk and other oblasts.

Due to the poor supply of liquid and solid fuel and poor coal quality, there were interruptions to the supply of thermal power in the Krasnoyarsky and Primorsky krays and in Kaliningrad, Kamchatka, Kirov, Omsk and Tomsk oblasts.

Up to the present time, nearly 40 percent of thermal power plants do not have a production or operations base and those that do have one lack enough of the proper equipment. Many thermal power plants lack specialized transport equipment and machinery.

The thermal power industry has 2750 boilers with nonmechanized fuel-supply and ash and slag removal systems.

Many of the autonomous republics' housing and municipal services ministries and the kray and oblast uprzhilkomkhoz [management of housing and municipal services] are not paying enough attention to public development or the creation of necessary work, living and relaxation conditions for employees of municipal energy establishments.

The collegium has ordered Roskommunenergo [RSFSR Municipal Power Management Bureau], the ministries of housing and municipal service of the autonomous republics, the kray and oblast executive committees, the Moscow City Executive Committee's fuel and energy management bureau, the Moscow Oblast Heat and Energy Bureau and the chief fuel and energy bureau of the Leningrad Oblast Executive Committee to fulfill the following tasks:

- to see that thermal power plants undergo even growth through the realization of thermal power systems whose development has been placed under the authority of Roskommunenergo and GUPiKS [not further identified];

- take over the management of thermal power plants from the housing and municipal services management organs of the local soviets;

- to create during 1986-1990 a subdivision in every power association (bureau) for the repair and adjustment of thermal power generating equipment, thermal power supply systems and automation and design (technological design) groups.

It was decided that it would be advisable to develop in 1986 and carry out during the 12th 5-year period certain measures for reconstructing certain sections of communal heating networks (construction of drainage systems, water outlets, automated drainage stations, removal of heating lines to exterior positions, insulation of pipelines with bituminous perlite).

This year, it will be necessary to work out a complex plan for improving the reliability of thermal systems and providing a continuous supply of natural

gas for furnaces and a program for automating individual heating units and equipping them with instruments for calculating the consumption of thermal energy and introducing means of regulating the consumption of thermal energy in housing for 1987-1990.

The Municipal Services Academy imeni K. D. Pamfilov, Roskommunenergo and GUPP [Chief Administration for Industrial Plants] must develop and introduce auxiliary technical vehicles (based on the KAMAZ automobile) that can be used to remove contaminants from heating systems, adapt the production of mobile lift and transport equipment for rigging and assembly work in central heating points and boiler shops, new and progressive systems of automatic regulation in thermal power points and electronic systems for automating and monitoring the work of central heating points.

Roskommunenergo, GUPiKS and Giprokommunenergo [State Republic Institute for the Design and Construction of Thermal Power Systems] must in 1986-1987 prepare technical and economic specifications for the reconstruction of thermal power plants with regard to manufacturing within them technological gear and mechanical devices for repairing thermal power generating equipment.

It was recommended that the administration and management of worker cadres and training institutes be turned over to thermal power management councils made up of young and highly-trained specialists.

In the first half of this year, Roskommunenergo and the PEU [Economic Planning Bureau] must prepare and introduce to the USSR Gosplan their own suggestions about how to increase the production of specialized machinery for municipal thermal power plants in the RSFSR and the output of existing plants.

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## NON-NUCLEAR POWER

### MOBILE POWER PLANT PRODUCTION URGED AS SOLUTION TO BLACKOUTS

Moscow PRAVDA in Russian 18 May 86 p 2

[Article by V. Gorokhov, general director of the Elektroagregat Association, Kursk: "The Current of 'Little' Power Plants: Thrift Is an Economic Reserve"]

[Text] Nearly every day, one sees letters from various republics and oblasts in which the writers ask for just one of the type of mobile power plants that our association produces.

Several builders have come to Kursk saying that they cannot manage without mobile power plants. The flow of letters and complaints is all the stronger in winter when power lines go out of order more often and customers are left without power. In the last three years, Kursk Oblast has seen hundreds of sudden blackouts and the same is happening in some of the neighboring oblasts in Central Russia and other places. Therefore, one hears people say: "Oh, if we had a back-up mobile power plant we would not feel the power losses so sharply...".

As long as such mobile plants are not available where needed, state and collective farms will lose much production due to blackouts. Every milkmaid is now responsible for 50 cows. Just try milking that many manually. It is also hard to manage an industrial plant, construction site, school or hospital with frequent blackouts.

In other words, we understand the needs of those who are appealing to us and would be glad to help. However, there is nothing that we can do because we are only producing enough for the number of consumers stated in the Gosplan list. This list includes lumbering crews, the builders of major transportation lines or natural gas pipelines, geologists and oil-field workers. The so-called "little" or mobile power plants are used in places where it is impossible or economically unfeasible to extend overhead power lines and this includes regions of Siberia, the Far North and the Far East. In the central part of Russia, far fewer of these plants are received than are needed.

Why has this happened? Why do we have such a shortage? There are many reasons. I will describe each of them in turn. Internal combustion engines

and several types of cooperatively-produced synchronous generators are needed to build mobile power plants. This gives one the distinct impression that no one is seriously working on standardization.

Let us look at plants of up to 100 kilowatts in power. USSR Gosplan has issued for them 14 standard sizes of diesel engines that are manufactured under the auspices of 5 different ministries. With a more efficient approach to this problem, one or at most two standard sizes would be enough. The situation is also worsened by the fact that a limited number of motors of each type are produced. Along with the problem of unification, we must also remember that many engines have long been obsolete. The problem is much the same with 30-kW generators too.

The industry has therefore been forced to use 6 completely different types of internal combustion engines of varying cylinder size, engine size, weight, service life, etc. Such "standardization" makes it necessary for manufacturers to create 6 different 30-kW units instead of one and this complicates production and lowers efficiency. This causes problems not only for us but also for consumers due to the lack of interchangeable spare parts and a poor supply of them. In addition, the YaAZ-204 diesel engines made by the Yaroslavl Motor Factory have long been obsolete. They will not take them out of production nor do they listen to our suggestions.

The association is now creating a new series of mobile power plants and units from a unified family of diesels produced by the Vladimir Tractor Factory. These machines are more reliable. In building these mobile units, we are trying to save more than 6000 tons of iron and steel and about 10,000 tons of diesel fuel annually.

It might seem that the advantages are obvious but there is one drawback. The Vladimir factory which created this family of diesel engines useful for mobile power plants and compressors and many other purposes is part of the Tractor and Agricultural Machinery Ministry which is responsible only for the production of agricultural equipment. But it is another branch of industry that is responsible for providing our national economy with all-purpose industrial diesel engines.

In connection with this, the role of the responsible divisions of Gosplan USSR and Gosstandart USSR is not well understood. They know very well about the shortage of motors and understand how important standardization is in overcoming that shortage. So why has nothing been done for so long?

Let us look at generators now. A standard series of generators has long been developed but the obsolete models are still being produced. For example, more than 10 plants are involved in making generators of up to 1000 kilowatts.

There is also no precise and well-adapted system for using our scientists, engineers and technicians. Our branch of industry has 10 independent scientific research institutes and design bureaus but not a single technical center for coordinating and directing their work.

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## NON-NUCLEAR POWER

### DEVELOPMENTS IN PUMPED STORAGE PLANT CONSTRUCTION

#### Conversion of Ukrainian GES to Pumped Storage

Moscow IZVESTIYA in Russian 30 Mar 86 p 1

[Article by N. Baklanov, IZVESTIYA correspondent: "Fact and Commentaries": "GES [Hydroelectric Power Plant]: Energy On Reserve"]

[Text] The decision has been made to reconstruct the Kiev and Kanev GES. Once rebuilt, in addition to their normal functions, they will also operate as "combined" pumped storage power plants [GAES].

If we were to compare the USSR United Power Network to a blood vessel, we could say that it is subject to periodic pressure changes. This is caused by the phenomenon of rhythm or to be more precise, by the lack of rhythm in our life activities. Every morning, the lights go on in millions of apartments along with cooking plates, razors and radios, etc. Then public transportation such as subways, buses and trams starts their work with heavier-than-normal loads. Then the heaviest consumers of electrical power, the factories, begin their working day.

Following the morning peak, there is a slight drop in consumption. In the evening, however, the load again rises as the lights go on again in homes, and televisions, tape players and record players are switched on. Towards midnight, the city begins to settle down for the night and there is the so-called night drop when the power consumption is minimal and the "pressure" on the system is sharply reduced.

The energy system is to be stabilized by pumped storage power plants that are able to use surplus energy at night to pump water from a lower to an upper reservoir and release it later to provide extra electrical hour during peak periods. "At the present time, there is only one pumped water storage electrical plant in the Ukraine, the Kiev GAES," said the minister of energy and electrification of the Ukrainian SSR, V. Sklyarov. "This is obviously not enough for the United Power Network which has become more and more 'rigid' and hard to control due to the construction and start-up of new nuclear and thermal electrical power plants".



The reconstruction of the Kiev and Kanev GES and the conversion of their turbines (the first such reconstruction in the world) into reversible units that can pump water into a head water can save a lot of money. In many cases, it is possible to adapt the structural and hydraulic features of an existing GES rather than build an entirely new GAES. This measure saves a great deal of money because it is 8-10 times cheaper to reconstruct a GES than to build a new GAES of the same output.

The ecological aspects of the reconstruction are described by the director of the Institute of Hydrobiology of the Ukrainian Academy of Sciences, V. Romanenko:

"We have created a special program to study how the operation of a converted GAES affects water quality, the aquatic life in the reservoirs and the number of fish. In our studies conducted during reverse-pumping tests of the turbines at the Kiev GES, we succeeded in finding a series of positive ecological effects.

Thus, the operation of converted GAES's increases the the oxygen levels in the tail waters, eliminates stagnation, flushes out shallow water and mixes the various water layers enough to equalize temperatures and oxygen levels all of which aids the self-purification on the lake.

Unfortunately, however, studies have revealed several negative effects from the operation of reverse turbines. For example, the water is stirred up and deposits from the lake bottom are brought to the surface.

Still one more negative effect is the loss of fish. In the operation of a pumped storage plant, the pumps suck in and pass not only water but fish as well. No one has yet determined how fish can be protected. It may be possible to use ultrasound signals to frighten off fish before the pumping operations start.

#### Construction of New GAES

Moscow STROITELNAYA GAZETA in Russian 4 May 86 p 2

[Article by V. Pelekh, TASS correspondent, Novodnestrovsk, Chernovitskaya Oblast: "Energy for Peak Hours"]

[Text] Powerful explosions shook the left bank of the Dnestr where construction began on an elevated based for the Dnestr GAES.

Daily electrical power demand fluctuates: it drops at night and sharply rises in the morning and evenings. The 2.2-million kW Dnestr GAES will provide energy to the United Power Network during the several peak hours each day. The storage reservoir is an elevated basin. The water pumped up into the gigantic bowl during the night is released through the GAES's reversible turbines to generate extra power during peak hours.

"The construction workers have a lot of work to do," said S. Gandzyuk,

director of the construction bureau at this complex plant. "we must remove more than 18 million cubic meters of ground and build over 6 kilometers of 8-meter wide tunnels. The builders have already begun the construction of these tunnels".

The chief allies of the builders are new equipment and new technology. Open excavation work is aided by the use of directed explosions that can efficiently break up large granite formations. For the underground work, the builders have begun to use a coal-mining excavator made in the machine-factories of the Donbass. With slight modification, it "eats" its way into surface rock layers, crushes them and feeds the crushed rock along a conveyor to waiting dump trucks. The labor productivity of the excavating crews has therefore been increased by two and one half time.

The construction is proceeding according to plan and all of the basic crews are working around the clock under brigade organization. The first units of the pumped storage plant will go on line within the present five-year period.

#### Reversible Turbines for Pumped Storage Plant

Moscow STROITELNAYA GAZETA in Russian 18 Apr 86 p 2

[Article by G. Dolzhenko: "Kharkov: GES and GAES"]

[Text] The decision has been made to use the Kiev and Kanev GES to build a pumped storage plant. Their turbines will be the first in the world to be converted to reversible units.

Changes in electrical power demand are always strongly felt. After the quiet night-time hours, the cities and villages turn on their lights and home appliances and public transportation, factories and places of work begin to consume electrical power too. Towards midnight, power consumption falls again. Such fluctuation complicate the work of thermal and nuclear electrical power plants. A GAES helps to stabilize conditions. Using surplus energy, these plants pump water during the night from the tail waters to the head waters and then used to generate power during peak hours. Specialists from the Kharkov Ukgidropoyekt [Ukrainian Hydraulic Design] Institute have already begun work on the technical documentation. A turbine of new design will also be made in Kharkov.

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## NON-NUCLEAR POWER

### AIR POLLUTION NECESSITATES NEW CLOSED SUBSTATION

Moscow TRANSPORTNOYE STROITELSTVO in Russian No 5, May 86 pp 24-25

[Article by N. G. Grabovskaya and A.M. Levin, engineers at Uralgiprotrans: "Closed Traction Substation". Capitalized passage appears in boldface in original]

[Text] Air pollution from a nearby cement plant made it necessary to build the USSR's first closed 110-kW closed traction substation.

The 110-kW circuit of the substation is a transit circuit with an automatically connected oil-immersed circuit breaker and two TDN-16000-110/10 VI chief step-down transformers with separators and short-circuiting switches on the 110-kW side and oil circuit-breakers on the 10-kW side. The 10-kW switchgear has an ordinary system of collecting buses separated by oil circuit-breakers. The substation was designed around two mutually-supporting rectifiers.

The bus apparatus includes a low-capacity VMT-110-B-20/1000 circuit breaker with a spring-driven PPK-2300 produced by Uralelektrotyazhmash [Urals Heavy Electrical Machinery Factory] in the closed 110 kW switchgear, VMPE-10 circuit breaker with built-in electromagnetic drives in the 10-kW switchgear and a BAV-43 circuit breaker in the 3.3-kW switchgear.

The traction transformers are housed in special sheds which protect them from dust. These transformer sheds are located next to buildings that house all of the substation's remaining equipment. Water-repellent coverings have been recommended to improve the reliability of the external insulation on the traction transformers as well as the insulators of the 10-kW busbars.

The traction substation consists of the building housing the 10- and 3.3-kW switchgear and machine shop, protective, battery and auxiliary facilities, the building for the main 110/10-kW step-down transformers and the building for the closed 110-kW switchgear (ZRU-110 kW). The latter two buildings have been sectioned off and are surrounded by a circular walk allowing equipment to be transported to any opening along the perimeter.

The ZRU-110 kW building is a two-story structure in which the first story is 6.5 meters high and the second floor is 7.5 meters high. The 110-kW overhead electrical power lines enter the substation through the second story.

Linear oil-filled inputs with removable flashboxes were installed at a height of 11.4 meters. Stretched insulator strings [natyazhnye girlyandy] were attached to the safety screens over the 110-kW oil-filled inputs at a height of 13.6 meters and the VL-110 kW overhead ground-wire cables were attached to the earth wire supports on the roof of the ZRU-110 kW building.

The second floor contains the elements of the high-frequency trap, the input and transformer isolators, separators and short-circuit switches, the 110-kW spark gaps and separate TFND-110 current transformers. The oil-filled inputs to the main transformer room lead from the second story to a height of 9.0 meters.

The first floor contains the equipment for the repair and working jumpers as well as the oil circuit breakers and voltage transformers.

The main transformer building consists of two parts: a separate chamber for the ventilators and two step-down transformers and the house transformers.

All of the buildings in the substation were built with two outputs.

The 10- and 3.3-kW switchgear building was designed like any other for a traction substation with closed PVE-ZmU2 rectifying converters (variant of a substation with rectifier-inverters).

The structure of the II-20/70 series of multistory industrial buildings with a grid of 6 x 6 m columns was taken as the basis for the design of the building housing the 110-kW switchgear and main step-down transformers. Panels used for unheated buildings were used to partition off the interior of the main building. The building is internally reinforced by longitudinal beams and girders. The stories are separated by II-24-2 series plates in two widths of 1.5 or 0.75 meters and the building foundations are of the barrel type.

Openings were provided to attach the transformers to the outside walls. These openings are filled with wall panels that are attached at 7 different points. The floor coverings have loops that allow them to be lifted out of the way. The power and control cables are set in steel pipes in the floor and along the walls and in a special cable conduit in the first story.

Heat is drawn out of the step-down transformer room by forced ventilation. The design of the transformer bases allows air to circulate under them without any loss of support strength.

Ventilation is considered efficient if the difference between the temperatures of the incoming and outgoing air is no more than 15°C at a maximum outdoor temperature of 21°C. Air circulation is supposed to be provided by two centrifugal fans for each transformer room. The heated air is removed through an exhaust chamber with a noise baffle. The fans are turned on and off by two air temperature switches.

The fan motors are not installed on the transformers.

Emergency and exhaust ventilation of the ZRU-110 kW building is provided by four axial OV-320 fans which are switched on with buttons on an exterior ladder at the building entrance.

Oil can be removed from the transformers and fed through pipes to a 30 m<sup>3</sup> oil tank.

TO AVOID A SIGNIFICANT COST INCREASE (BY ALMOST ONE-THIRD) AND LONGER CONSTRUCTION TIMES OF A TRACTION SUBSTATION, IT IS NECESSARY TO PRODUCE APPARATUS WITH INSULATION THAT ALLOWS OPEN EQUIPMENT TO OPERATE IN REGIONS WITH AIR POLLUTION.

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## NON-NUCLEAR POWER

### INEFFICIENCIES OF SMALL MUNICIPAL BOILERS CRITICIZED

Moscow STROITELNAYA GAZETA in Russian 4 Apr 86 p 3

[Article by S. Dvoretzky, special correspondent, Lithuanian SSR under the rubric "Strict Accounting of Resources": "Clean Skies Over the City"]

[Text] At this time, almost every third ton of fuel consumed goes into heating buildings. Only 52 percent of the country's heating is provided by centralized heating systems. The remaining 48 percent comes from nearly 300,000 small boiler rooms but these produce so many fumes and cinders and are so much work for the communal services of cities and settlements. If we could liquidate at least half of these dwarves we could save millions of tons of fuel each year. It is of course hard to make the decision but it can be done and I am completely convinced of this.

The last time I visited Kaunas it was 10 years ago during the winter. This city, which can trace its history back to as early as the 13th century, is an unusually well-harmonized mixture of medieval structures and modern apartment buildings. But I was struck by something else here: columns of smoke literally coagulated the skies over the city. Blackened snow lay on the lawns and squares and the walls of houses were grimy with soot. "What do you want?", they said. "There is not enough heating in the city so the houses are all heated by their own small furnaces and boiler rooms. Kaunas lies in a depression so the smoke is held down by upper air layers and trapped".

On my most recent visit to Kaunas, something about the city seemed different and I did not even realize what that was. There was something different about the familiar houses and streets, the silver ribbon of the Nieman and the way the high spires of the churches and town halls [Rathaus] seemed to be pointing up into the clean skies...That must have been it. Something unusual for Kaunas, a clean sky over the city during winter. Where were those liquid streams of smoke floating over the city's houses? What was the secret here? I asked the city executive committee.

The deputy director of the city housing authority, Antanas Veselka, spread out over a huge desk in the mayor's office a map of Kaunas. Beige, yellow, green and red spots were scattered over the different neighborhoods.

"Every color shows how many boilers were shut down in the city over the last 5 years," explained Veselka. "During the 11th 5-Year Period, a total of 254 small heating systems were shut down. If we count our progress from 1979 when the Soviet of Ministers made an exception to grant us permission to begin shutting down the small boilers, then we have closed 398 of them. Nearly 600 houses have been connected to the central heating plant [TETs]. For comparison, there were 678 boilers in Kaunas before we began this project.

"The central and older parts of the city were the first to have their heating systems reconstructed because these were the neighborhoods that contained the most small boilers heating just one or two buildings. Furthermore, the apartments in many buildings, sometimes even 3- or 5-story buildings, had coal or wood stoves.

The reconstruction itself was begun with the preparation of a plan quickly worked out by specialists at the Kaunas division of the republic's communal design institute. Gorremontstroytrest [City Repair and Construction Trust] was ordered to implement these plans but it ran into difficulties at the very start of work. The city did not have enough heat. The city's sole central heating plant could not handle both the new and old houses. However, they did find a solution in installing an extra boiler to the central heating plant.

"I should point out that this was only a temporary measure," said the chairman of the Kaunas City Executive Committee, Pyatras Stashkunas. The city is growing up and out and new subdivisions are continually being built. Therefore, it was long ago foreseen that two heating heating plants would be and three pumping stations would be needed to support the city's population. These are already being built.

"What aside from an improved ecology has the switch from small to centralized heating systems given us?"

"There are many advantages in this. First of all, the number of people needed to maintain these small boilers was reduced. Four people were needed to service each of these around the clock. How are supposed to find that many? We would have to hire the people who already live in these buildings. Second, we no longer have to buy enormous quantities of fuel, ship it in and store it. This has freed up storage space that was previously used to hold heating fuel. Third, we have considerably improved fire protection because it is the little boilers and furnaces that are the greatest source of fires. Fourth, the heating of homes and buildings is now much better and more reliable. Fifth, it is now much cheaper for people to heat the buildings that have stoves".

Specialists have estimated that the annual costs for liquidating small boilers and creating a fund for centralized heating is something on the order of 600,000 rubles. However, these costs will be paid back within the first 6 years because the closing of 50 boilers will save 100,000 rubles per year.

However, my conversation with the chairman of the city executive committee did not cover only the positive side of this project. P. Strashunas also said

that they have had difficulties in carrying out the reconstruction. These involved the still-unsolved problem of treating pipes for corrosion, a constant shortage of hydraulic equipment, poor quality of apartment radiators and poor automation in the boiler rooms.

"Stashkunas told me: "Gosstroy USSR has ordered that heating points can only be designed and built with RK-1 and RD-1 heat and pressure regulators. Up to now, however, industry was only producing RR-type regulators. Each year, we had to receive permission from the republic Gosstroy to build our heating systems with the RR regulators. Still another sore point was the lack of thermostats and this means that we pay good money for a projected amount of heat but what we are actually getting is determined by the temperature of the air outdoors. And there is also no way of checking how accurate the billing is."

At the end of our conversation, the deputy director of the housing authority, A. Veselka, showed me still another map. For the people of Kaunas, it serves as an instruction for action to be taken in the 12th 5-Year Period.

"As you see, the old part of the city still has 50 houses with stove heating. Soon, these too will be connected to the TETs. The main work is being carried out here," said A. Veselka pointing out one housing project, "where we will shut down 148 small boilers. The heating mains have already been laid and we will be building the neighborhood lines. The boilers that we have so far been unable to replace with central heating will be converted from solid fuel to natural gas. There remains only 23 of these."

While praising the people of Kaunas, their initiative and steadfastness, we must give some serious thought to the fate of other cities which are being polluted by tens of thousands of small boilers. The work to shut down these small boilers cannot be an exception to the rule but a matter of planned and organized work. The skies over our cities should be clean!

#### Commentary of a Specialist

Everyone agrees that it would be easier to heat our cities with central heating plants. For every gigacalorie of heat they produce, small boilers consume 230-270 kilograms of fuel while a TETs uses just over 170. The difference is very obvious. Here is the data for just one year: 3500 small boilers have been liquidated under the state's fuel conservation program and 4100 have been built in spite of the very obvious need to liquidate them!

Existing central heating plants use only two-thirds of their full capacity. Why? Why, considering the unquestioned advantages of central heating systems, has the switch to them taken so long? The urban construction department of STROITELNAYA GAZETA asked the deputy chairman of Gosgrazhdanstroy [State Committee for Civil Construction and Architecture], E. Sarnatsky, to answer these questions:

Unfortunately, it is often the case that small boilers are built because builders and contracting organizations wish to make their work easier. In



order to operate normally, a TETs must have heating lines. To have these lines laid, all potential consumers must pay their share of the investment, money must be acquired for metal and builders and designers have to be brought in. From the point of view of negligent managers, all of this is a lot of trouble. Frosts and cold weather, as they say, will not wait. So they keep building small boilers.

In our country, we still do not have the sort of economic levers that would discourage the building of small boilers. Economists should not put the matter off but start thinking about how to create such levers. As long as these small boilers continue to operate, we will have to maintain strict energy and construction discipline. The general construction plan for the city calls for the construction of a network of heating lines from the nearest TETS so we must build them.

The local soviets and the communal housing authorities of the city executive committees should see that such discipline is enforced. Kaunas's experiences as described in the article above confirm the effectiveness of such an approach.

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GENERAL

SUPREME SOVIET DECREE RAPS POWER MINISTRY ON RURAL ELECTRIFICATION

Moscow VEDEMOSTI VERKHOVNOGO SOVETA SOYUZA SOVETSKIKH SOTSIALISTICHESKIKH  
RESPUBLIK in Russian 30 Apr 86 pp 272-275

[Text] Section I

Decree of the USSR Supreme Soviet Presidium No 291

Fulfillment of state planning tasks for the development of rural electrification and conservation of electric power in RSFSR Non-Chernozem Zone agricultural production

The Presidium of the USSR Supreme Soviet notes that in accordance with the decisions of the Communist Party, considerable work was carried out in the Non-Chernozem Zone in the RSFSR during the 11th Five-Year Plan (FYP) to strengthen the material-technical base of agriculture and to socially restructure rural areas. The extent of electrification for labor and consumption of electrical power on kolkhozes and sovkhozes rose more than one-third, which provided for improved working and living conditions for rural inhabitants.

At the same time, agriculture in the RSFSR Non-Chernozem Zone failed to provide for the growth outlined for the 11th FYP in electric power consumption and for extent of electrification for labor. The RSFSR Council of Ministers, and Ministry of Power Engineering and Electrification, USSR, failed to undertake sufficient measures to consolidate and develop the rural electric power base, the electrification of production processes in field operations and animal husbandry, and to increase its effect on the achievement of a more stable development of agricultural production and its conversion to an industrial base.

Electrification is unacceptably slow for thermal technological processes, an area which might have compensated to a definite degree for shortages in the work force and to free considerable fuel resources, particularly petroleum products. Shortcomings in electrification reduce the yield of major capital investments and preclude the full utilization of the potential in Non-Chernozem Zone agriculture, which today provides almost one-third of agricultural production in the Russian Federation.

During the 11th FYP, the USSR Ministry of Power Engineering and Electrification failed to fulfill construction plans for rural electric systems, carried out

insufficient volumes of work to reconstruct and repair those systems, and provided unsatisfactory technical services.

The condition of the electric systems frequently fails to provide reliable supply of electric power to rural customers. Approximately 30 percent of major animal husbandry complexes, poultry plants, and other agricultural facilities which belong to Category I for reliability of electric power, do not have reserve sources of electrical current, and in a number of oblasts, the figure is above 60 percent. Annually, a considerable number of emergency disconnects of customers take place, with farms incurring large losses as a result.

Effective measures are not being undertaken to improve the quality of electric power, and indicators established by state standard are grossly violated. Voltage deviations in rural systems often reach 20 percent or more, which substantially reduces the service life of electrical equipment, lighting, and household appliances.

Production interfarm associations of "Rosagropromenergo" failed to receive requisite development of material-technical bases. Many farms receive virtually no assistance in servicing electric installations from specialized organizations, and bases for this generally do not exist on the kolkhozes and sovkhozes.

A check showed that rates and quality of development initiatives carried out by scientific-research and planning-design organizations within the USSR Gosagroprom system and of industrial ministries in the field of agricultural electrification do not provide for the realization of party directives relating to acceleration of scientific-technological progress. The existing scientific potential is being utilized weakly to solve tasks for developing and improving efficiencies in electrification, and the introduction of energy-saving equipment and technologies in agriculture production. Scientific research is conducted without the necessary coordination. A number of important tasks envisaged by state scientific-technological programs for the development and introduction of new methods and equipment in agricultural electrification are lagging. The appropriate link between science and kolkhozes and sovkhozes is absent. The consolidation is particularly in need of material and developmental-experimental bases of scientific institutions.

A decisive improvement is required in work to improve rational and economical use of electrical energy. Ceilings for its expenditure are established without consideration of actual requirements and existing normatives. Accounting for and monitoring of electric power use is poorly set up in kolkhozes and sovkhozes. The demand for electric meters is being satisfied very poorly. Programs to conserve electric power are not being developed on a majority of farms.

Kolkhozes and sovkhozes are provided insufficiently with cadres of qualified worker and specialist personnel for the operation of power equipment. More than 40 percent of the personnel do not have specialized training. Problems relating to improving housing and living conditions for power workers are being resolved slowly.

Funds allocated for many types of electric equipment, apparatus, and other articles absolutely fail to satisfy the growing requirements of the farms. The

USSR Ministry of the Electro-Technical Industry failed to provide for the fulfillment of established tasks for the assimilation and production of new types of equipment.

Industry is manufacturing a limited range of electric appliances for home and individual subsidiary farm use. The problem of employing a reduced rate for electric power use for domestic needs of the rural populace is slow to be resolved.

Councils of Peoples Deputies, their executive and directive agencies devote insufficient attention to the coordination and control of operations for enterprises and organizations of the USSR Gosagroprom and USSR Ministry of Power Engineering and Electrification in the resolution of questions relating to rural electrification.

Guided by the directives of the CPSU 27th Congress on the persistent implementation of the party's modern agrarian policy, and viewing electrification as a most important means of intensifying production and improving working and living conditions for rural workers, the USSR Supreme Soviet Presidium decrees:

1. To direct the attention of the USSR Ministry of Power Engineering and Electrification and of the minister personally, comrade A.I. Majorets, and of the RSFSR Council of Ministers to the unsatisfactory situation with regard to the reliable provision of electrical power to rural areas, and to propose that they take decisive measures to eliminate the shortcomings noted, to reinforce work to electrify agricultural production, to expand the use of electric power in cultural-domestic service to the rural populace, for the economical and rational use of all fuel-energy resources, the consolidation of the production base for construction and repair-operating organizations, the completed transfer in 1986 of rural electric systems from kolkhozes and sovkhozes to the balance of enterprises within the USSR Ministry of Power Engineering and Electrification system, and the organization of their quality service. Programs are to be implemented to improve training and assignments for rural power personnel.
2. The USSR Ministry of Power Engineering and Electrification is to achieve in the shortest timeframe possible an improvement in the reliability and quality of electric power supply to rural consumers, to provide for unconditional fulfillment of state plans for construction of rural electric systems, increased volumes of reconstruction and repair work, to complete during the 12th FYP necessary reserve capacities for Category I consumers, and to significantly expand the scale for implementing automated and remote control of rural electric systems.

The use of the production base for construction-installation and repair-operation organizations is to be strengthened and improved. Increased demands are to be made of personnel with increased responsibility levied on appropriate enterprises and organizations for uninterrupted power supply, with greater use of moral and material incentives for this purpose.

3. The RSFSR Supreme Soviet Presidium and RSFSR Council of Ministers are to strengthen work of Peoples Deputies Councils in autonomous republics and oblasts of the RSFSR Non-Chernozem Zone, their executive and directive agencies to manage

agro-industrial committees and associations in improving the reliability of electrical power supply, and of fulfilling plan tasks for rural electrification. Measures are to be taken to strengthen the material-technical base for rural power engineering, economical and rational use of electric power, the resolution of tasks to improve social and living conditions for electric service workers, and to actively disseminate the experience of leading collectives in this area. Provision is to be made for the necessary coordination and control of operations of subordinate organizations and enterprises implementing electrification of the agricultural sector.

4. The USSR Gosagroprom and V.I. Lenin All-Union Academy of Agricultural Sciences are to undertake programs to further expand the use of electric power in agriculture, the introduction of energy-saving equipment and technologies, of mechanization and automation, the use of which will promote a significant increase in labor productivity, reductions of produce losses, and improvement in quality.

Provision is to be made for increased organizational work and control over the implementation of scientific-technological progress in the agricultural electrification sphere. A restructuring is to be achieved for scientific-research and planning-design organizations operations relating to problems of agricultural electrification, and to bring those operations more into line with the requirements of kolkhozes and sovkhozes. Development of the developmental-experimental base for appropriate scientific institutions is to be accelerated.

The USSR Ministry of Power Engineering and Electrification and the USSR Ministry of the Electrotechnical Industry will cooperate to develop programs to accelerate the creation of efficient electrotechnical and thermal power equipment for rural electrification.

The USSR Gosagroprom is to complete in the near future a practical resolution of problems associated with the organization and consolidation of electrical service for the use of appropriate equipment in kolkhozes, sovkhozes, inter-farm and other enterprises and organizations.

5. Direct this decree to the chambers of the USSR Council of Ministers with materials of the Commission on Power Engineering and Commission for the Agro-Industrial Complex for measures to be undertaken which will provide for:

growth during the 12th FYP of work volumes to develop, reconstruct, and repair rural electrical systems, substantial improvement in providing of equipment and instruments for power use accounting, of materials, and of transportation assets and proceeding from this base, improve reliability of power supply to rural consumers and to resolve other problems associated with the USSR Food Program;

the establishment of necessary conditions for further expanded uses of electrical power, including night hours, in agricultural production and domestic use for the rural populace; and increased economic accountability of power-supplying organizations for losses incurred because of interruptions of power supply to agricultural consumers.

6. Recommend to the Supreme Soviet Presidiums of union and autonomous republics that measures be adopted to improve rural electrification, more fully utilize the resources of local Peoples Deputies Councils in the resolution of problems, and to increase the accountability of appropriate economic organizations and their management for uninterrupted and quality electric power supply to rural consumers.

7. The RSFSR Council of Ministers, the USSR Ministry of Power Engineering and Electrification, USSR Gosagroprom, and the USSR Ministry of the Electrotechnical Industry are to inform the USSR Supreme Soviet Presidium of the results of work to fulfill this decree on 1 July 1987.

Chairman, USSR Supreme Soviet Presidium, A. Gromyko

Secretary, USSR Supreme Soviet Presidium, T. Menteshashvili

Moscow, Kremlin, 25 April 1986.

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- END -